CLAIMS

1. An Fve polypeptide comprising at least one biological activity of native Fve protein, and being a fragment, homologue, variant or derivative thereof.

2. An Fve polypeptide according to Claim 1, which comprises an immunomodulatory activity.

3. An Fve polypeptide according to Claim 1 or 2, which comprises a biological activity selected from the group consisting of: up-regulation of expression of Th1/Tc1 cytokines, preferably IFN-γ and TNF-α, down-regulation of expression of Th2/Tc2 cytokines, preferably IL-4 and IL-13, up-regulation of expression of T regulatory (Tr) cytokines IL-10 and TGF-β, hemagglutination activity, cell aggregation activity, lymphocyte aggregation activity, lymphoproliferation activity, up-regulation of expression of IL-2, IFN-γ, TNF-α, but not IL-4 in $CD3^+$ T cells, interaction with T and NK cells, adjuvant activity, stimulation of $CD3^+$ $CD16^+$ $CD56^+$ natural killer (NK) T cells and $CD3^+$ $CD8^+$ $CD18^{+\,bright}$ T cells, and up-regulation of allergen specific Th1 immune responses.

4. An Fve polypeptide according to Claim 1, 2 or 3, in which the polypeptide comprises between 2 to 20 residues of amino acid sequence flanking the glycine residue corresponding to position 28 of Fve.

5. An Fve polypeptide according to any preceding claim, in which the polypeptide comprises the sequence RGT or the sequence RGD.

6. An Fve polypeptide according to any preceding claim, in which the polypeptide has a sequence as set out in **Appendix A** or **Appendix B**.

7. An Fve polypeptide comprising an sequence selected from the group consisting of: Fve R27A, Fve T29A, GST-Fve (wild type), GST-Fve R27A, and GST-Fve T29A, and fragments, homologues, variants and derivatives thereof.

8. A polypeptide comprising a first portion comprising at least a fragment of native Fve, or an Fve polypeptide according to any preceding claim, and a second portion comprising at least a fragment of an allergen.

9. A polypeptide according to Claim 8, in which the allergen comprises an allergen from a mite, preferably from Family *Glycyphagidae* or Family *Pyroglyphidae*, preferably a group 1 allergen (Der p 1, Der f 1, Blo t 1, Eur m1, Lep d 1), a group 2 allergen (Der p 2, Der f 2, Blo t 2, Eur m 2, Lep d 2), a group 5 allergen (Blo t 5, Der p 5, Der f 5, Eur m 5, Lep d 5) a group 15 allergen (Der p 15, Der f 15, Blot 15, Eur m 15, Lep d 15).

10. A Fve polypeptide or a polypeptide according to Claim 8 or 9, which is selected from the group consisting of: Blo t 5-Fve, Blo t 5-FveR27A, Blo t 5-FveT29A, Der p 2-FveT29A, GST-Der p 2-FveR27A, GST-Der p 2-FveT29A, Blo t 5-Der p 2-FveR27A and Blo t 5-Der p 2-FveT29A.

11. A polypeptide according to Claim 8, in which the allergen is selected from the group consisting of: tree pollen allergen, Bet v 1 and Bet v 2 from birch tree; grass pollen allergen, Phl p 1 and Phl p 2 from timothy grass; weed pollen allergen, antigen E from ragweed; major feline antigen, Fel d; major fungal allergen, Asp f1, Asp f2, and Asp f3 from *Aspergillus fumigatus*.

12. A polypeptide comprising a first portion comprising at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second portion comprising at least a fragment of a viral antigen selected from the group consisting of: E6 and E7 from HPV; core Ag and E2 from HCV; core and surface antigens from HBV; LMP-1, LMP-2, EBNA-2, EBNA-3 from EBV; and Tax from HTLV-1.

13. A polypeptide according to Claim 12, which comprises HCV Core23-FveT29A, or HPV E7-FveT29A.

14. A polypeptide comprising a first portion comprising at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second portion comprising at least a fragment of a tumour-associated antigen selected from the group consisting of: MAGE-1, MAGE-2, MAGE-3, preferably a sequence, BAGE, GAGE, PRAME, SSX-2, Tyrosinase, MART-1, NY-ESO-1, gp100, TRP-1, TRP-2, A2 melanotope, BCR/ABL, Proteinase-3/Myeloblastin, HER2/neu, CEA, P1A, HK2, PAPA, PSA, PSCA, PSMA, pg75, MUM-1, MUC-1, BTA, GnT-V, β-catenin, CDK4, and P15.

15. A polypeptide according to Claim 14, which comprises MAGE3-FveT29A, MART1-FveT29A or CEA-FveT29A.

16. A nucleic acid encoding a Fve polypeptide or a polypeptide according to any preceding claim.

17. A nucleic acid according to Claim 16, in which the nucleic acid comprises CGT GGT ACC, or a sequence which differs from the above by virtue of the degeneracy of the genetic code and which encodes a sequence RGT.

18. A nucleic acid comprising a first sequence encoding at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second sequence encoding at least a fragment of an allergen.

19. A nucleic acid according to Claim 18, which comprises Blo t 5-Fve, Blo t 5-FveR27A, Blo t 5-FveT29A, Der p 2-FveT29A, GST-Der p 2-FveR27A, GST-Der p 2-FveT29A, Blo t 5-Der p 2-FveR27A or Blo t 5-Der p 2-FveT29A.

20. A nucleic acid comprising a first sequence encoding at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second sequence encoding at least a fragment of a viral antigen selected from the group consisting of: E6 and E7 from HPV; core Ag and E2 from HCV; core and surface antigens from HBV; LMP-1, LMP-2, EBNA-2, EBNA-3 from EBV; and Tax from HTLV-1.

21. A nucleic acid according to Claim 20, which comprises HCV Core23-FveT29A, or HPV E7-FveT29A.

22. A nucleic acid comprising a first sequence encoding at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second sequence encoding at least a fragment of a tumour associated antigen selected from the group consisting of: MAGE-1, MAGE-2, MAGE-3, BAGE, GAGE, PRAME, SSX-2, Tyrosinase, MART-1, NY-ESO-1, gp100, TRP-1, TRP-2, A2 melanotope, BCR/ABL, Proteinase-3/Myeloblastin, HER2/neu, CEA, P1A, HK2, PAPA, PSA, PSCA, PSMA, pg75, MUM-1, MUC-1, BTA, GnT-V, β-catenin, CDK4, and P15.

23. A nucleic acid according to Claim 22, which comprises MAGE3-FveT29A, MART1-FveT29A or CEA-FveT29A.

24. A nucleic acid selected from the group consisting of: Fve R27A, Fve T29A, GST-Fve (wild type), GST-Fve R27A, GST-Fve T29A, Blo t 5-Fve, Blo t 5-FveR27A, Blo t 5-FveT29A, GST-Der p 2-FveR27A, GST-Der p 2-FveT29A, Blo t 5-Der p 2-FveR27A, Blo t 5-Der p 2-FveT29A, and fragments, homologues, variants and derivatives thereof.

25. A vector, preferably an expression vector, comprising a nucleic acid sequence according to any of Claims 16 to 24.

26. A DNA vaccine comprising a nucleic acid encoding Fve, a nucleic acid according to any of Claims 16 to 24, or a vector according to Claim 25.

27. A host cell comprising a nucleic acid encoding Fve, a nucleic acid according to any of Claims 16 to 24, or a vector according to Claim 25.

28. A transgenic non-human organism comprising a nucleic acid encoding Fve, a nucleic acid according to any of Claims 16 to 24, or a vector according to Claim 25.

29. A transgenic non-human organism according to Claim 28 which is a bacterium, a yeast, a fungus, a plant or an animal, preferably a mouse.

30. A pharmaceutical composition comprising a polypeptide according to any of Claims 1 to 15, a nucleic acid according to any of Claims 16 to 24, a vector according to Claim 25, a DNA vaccine according to Claim 26, or a host cell according to Claim 27, together with a pharmaceutically acceptable carrier or diluent.

31. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 as an immumodulator.

32. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 to enhance an immune response in a mammal.

33. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 to stimulate proliferation of $CD3^+$ $CD8^+$ $CD18^{+\,bright}$ T cells.

34. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 to stimulate proliferation of $CD3^+$ $CD16^+$ $CD56^+$ natural killer (NK) T cells.

35. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 to stimulate production of IL-2, IL-10, TGF-β, IFN-γ or TNF-α in $CD3^+$ cells.

36. Use according to Claim 35, in which production of IL-4 is not stimulated in the $CD3^+$ cells.

37. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 as an adjuvant for a vaccine.

38. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30 in a method of treatment or prophylaxis of a disease.

39. Use of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector or host cell according to any of Claims 1 to 30 for the preparation of a pharmaceutical composition for the treatment of a disease.

40. A method of treating an individual suffering from a disease or preventing the occurrence of a disease in an individual, the method comprising administering to the individual a therapeutically or prophylactically effective amount of a native Fve polypeptide, or an Fve polypeptide, nucleic acid, vector, DNA vaccine, host cell, transgenic organism, or a pharmaceutical composition according to any of Claims 1 to 30.

41. A use or method according to any of Claims 38, 39 or 40, in which the disease comprises an atopic disease or allergy.

42. Use of a DNA vaccine according to Claim 26, preferably as dependent on Claim 18 or 19, in a method of treatment or prevention of an allergy.

43. A use or method according to Claim 41 or 42, in which the allergy is selected from the group consisting of: allergic asthma, a seasonal respiratory allergy, a perennial respiratory allergy, allergic rhinitis, hayfever, nonallergic rhinitis, vasomotor rhinitis, irritant rhinitis, an allergy against grass pollen, weed pollen, tree pollen or animal danders, an allergy associated with allergic asthma and a food allergy.

44. A use or method according to Claim 41, 42 or 43, in which the allergy is to a house dust mite from Family Glyphagidae, preferably *Blomia tropicalis* or from Family Pyroglyphidae, preferably *Dermatophagoides pteronyssinus* or *Dermatophagoides farinae*, or to fungi or fungal spores, preferably *Aspergillus fumigatus*, or to tree pollen allergens, preferably from birch tree, or grass pollen allergens, preferably from timothy grass, or weed allergens, preferably ragweed.

45. A use or method according to any of Claims 38, 39 or 40, in which the disease comprises a cancer.

46. Use of a DNA vaccine according to Claim 26, preferably as dependent on Claim 20 or 21, in a method of treatment or prevention of a cancer, or in a method of suppressing tumour progression.

47. Use of a DNA vaccine according to Claim 26, preferably as dependent on Claim 22, in a method of treatment or prevention of a cancer, or in a method of suppressing tumour progression.

48. A use or method according to Claim 45, 46 or 47, in which the cancer comprises a T cell lymphoma, melanoma, lung cancer, colon cancer, breast cancer or prostate cancer.

49. A method of identifying a molecule capable of binding to Fve, the method comprising exposing a native Fve polypeptide, or an Fve polypeptide or nucleic acid, vector, host cell or transgenic organism according to any of Claims 1 to 25, 27 and 28 to a candidate molecule and detecting whether the candidate molecule binds to the native Fve polypeptide, or an Fve polypeptide or nucleic acid, vector, host cell or transgenic organism.

50. A method of identifying an agonist or antagonist of an Fve polypeptide, the method comprising: (a) providing a cell or organism; (b) exposing the cell or organism to a native Fve polypeptide, or an Fve polypeptide or nucleic acid, vector, host cell or transgenic organism according to any of Claims 1 to 25, 27 and 28; (c) exposing the cell to a candidate molecule; and (d) detecting an Fve mediated effect.

51. A method according to Claim 50, in which the Fve mediated effect is selected from the biological activities set out in Claim 2.

52. A method according to Claim 49, 50 or 51, in which the method further comprises isolating or synthesising a selected or identified molecule.

53. A molecule identified or selected using a method according to any of Claims 49 to 52.

54. A native Fve polypeptide, or an Fve polypeptide in crystalline form.

55. A native Fve polypeptide, or an Fve polypeptide in crystalline form according to Claim 54, which has the structural coordinates shown in **Appendix C**.

56. A model for at least part of Fve made using a crystal according to Claim 54 or 55.

57. A method of screening for a receptor capable of binding to Fve, or designing a ligand capable of modulating the interaction between Fve and an Fve receptor, comprising the use of a model according to Claim 56.

58. A computer readable medium having stored thereon the structure of a crystal according to Claim 54 or 55, or a model according to Claim 56.

59. A ligand identified by the method according to Claim 57.

60. Use of a molecule according to Claim 53 or a ligand according to Claim 59 for the treatment or prevention of a disease in an individual.

61. A pharmaceutical composition comprising a molecule according to Claim 53 or a ligand according to Claim 59 and optionally a pharmaceutically acceptable carrier, diluent, excipient or adjuvant or any combination thereof.

62. A method of treating and/or preventing a disease comprising administering a molecule according to Claim 53 or a ligand according to Claim 59 and/or a pharmaceutical composition according to Claim 61 to an individual in need of such treatment.

63. A method of amplifying a sub-population of cells, the method comprising: (a) obtaining a population of cells from an individual; (b) amplifying $CD3^+$ $CD8^+$ and $CD18^{+\,bright}$ T cells by exposing the population of cells to a native Fve polypeptide, or an Fve polypeptide or nucleic acid, vector, host cell or transgenic organism according to any of Claims 1 to 25, 27 and 28.

64. A method according to Claim 63, further comprising the step of: (c) isolating the $CD3^+$ $CD8^+$ and $CD18^{+\,bright}$ T cells.

65. A method of treating an individual suffering from a disease or preventing the occurrence of a disease in an individual, the method comprising amplifying a $CD3^+$ $CD8^+$ and $CD18^{+\,bright}$ T cell by a method according to Claim 63 or 64, and administering the amplified $CD3^+$ $CD8^+$ and $CD18^{+\,bright}$ T cell to an individual.

66. An amplified population of $CD3^+$ $CD8^+$ and $CD18^{+\,bright}$ T cells obtainable by a method according to Claim 63 or 64.

67. A pharmaceutical composition comprising an amplified population of $CD3^+$ $CD8^+$ and $CD18^{+\,bright}$ T cells according to Claim 66, together with a pharmaceutically acceptable excipient or carrier.

68. A combination comprising a first component comprising an immunomodulator and a second component comprising at least a fragment of an allergen, a viral antigen or a tumour associated antigen.

69. A combination according to Claim 68 in which the first component is separate from the second component.

70. A combination according to Claim 68 in which the first component is associated with the second component.

71. A combination according to Claim 68 which is a fusion protein.

72. A combination according to Claim 68, in which the first component comprises a native Fve polypeptide, or a polypeptide according to any of Claims 1 to 15.

73. A combination according to any of Claims 68 to 72, in which the second component comprises an allergen selected from the group consisting of: a mite allergen, an mite allergen from Family *Glycyphagidae* or Family *Pyroglyphidae*, a group 1 allergen

(Der p 1, Der f 1, Blo t 1, Eur m1, Lep d 1), a group 2 allergen (Der p 2, Der f 2, Blo t 2, Eur m 2, Lep d 2), a group 5 allergen (Blo t 5, Der p 5, Der f 5, Eur m 5, Lep d 5), a group 15 allergen (Der p 15, Der f 15, Blot 15, Eur m 15, Lep d 15), a tree pollen allergen, Bet v 1 and Bet v 2 from birch tree; grass pollen allergen, Phl p 1 and Phl p 2 from timothy grass; weed pollen allergen, antigen E from ragweed; major feline antigen, Fel d; major fungal allergen, Asp f1, Asp f2, and Asp f3 from *Aspergillus fumigatus*.

74. A combination according to any of Claims 68 to 72, in which the second component comprises a viral antigen selected from the group consisting of: E6 and E7 from HPV; core Ag and E2 from HCV; core and surface antigens from HBV; LMP-1, LMP-2, EBNA-2, EBNA-3 from EBV; and Tax from HTLV-1.

75. A combination according to any of Claims 68 to 72, in which the second component comprises a tumour-associated antigen selected from the group consisting of: MAGE-1, MAGE-2, MAGE-3, BAGE, GAGE, PRAME, SSX-2, Tyrosinase, MART-1, NY-ESO-1, gp100, TRP-1, TRP-2, A2 melanotope, BCR/ABL, Proteinase-3/Myeloblastin, HER2/neu, CEA, P1A, HK2, PAPA, PSA, PSCA, PSMA, pg75, MUM-1, MUC-1, BTA, GnT-V, β-catenin, CDK4, and P15.

76. An immunomodulator-antigen conjugate, preferably an immunomodulator-allergen conjugate, an immunomodulator-tumour associated antigen conjugate or a immunomodulator-viral antigen conjugate, in which the immunomodulator preferably comprises an Fve polypeptide.

77. A polypeptide comprising a first portion comprising at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second portion comprising at least a fragment of a viral antigen selected from the group consisting of an antigen from from Adenovirus, Parainfluenza 3 virus, Human Immunodeficiency Virus (HIV), Herpes simplex virus, HSV, Respiratory syncytial virus, RSV, or Influenza A, Flu A.

78. A nucleic acid comprising a first sequence encoding at least a fragment of native Fve, or an Fve polypeptide according to any of Claims 1 to 7, and a second sequence encoding at least a fragment of a viral antigen selected from the group consisting of an antigen from from Adenovirus, Parainfluenza 3 virus, Human Immunodeficiency Virus (HIV), Herpes simplex virus, HSV, Respiratory syncytial virus, RSV, or Influenza A, Flu A.

79. A combination according to any of Claims 68 to 72, in which the second component comprises a tumour-associated antigen selected from the group consisting of antigen from from Adenovirus, Parainfluenza 3 virus, Human Immunodeficiency Virus (HIV), Herpes simplex virus, HSV, Respiratory syncytial virus, RSV, or Influenza A, Flu A.

80. A nucleic acid sequence, including an Fve nucleic acid sequence, a polypeptide sequence, including a Fve polypeptide sequence, a method of treatment, a method of diagnosis, a host cell, vector, transgenic animal, a transgenic plant, a genetically-modified lactose bacilli, assay, vaccine, phamaceutical composition or agent substantially as hereinbefore described with reference to and as shown in the accompanying drawings.